ERIC Project

Final Report

A FOLLOW-UP STUDY OF CREATIVELY TALENTED COLLEGE STUDENTS

By

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ACKNOWLEDGEMENT

The investigator wishes to acknowledge his appreciation and sincere thanks to the Educational Research and Innovation Committee of the National Council of Educational Research & Training, New Delhi, for providing financial support to this project. I am greatly indebted to Prof M.K. RAINA, who provided constant encouragement and support throughout the project.

I owe a special debt of gratitude to all those subjects who participated in this study. I acknowledge my thanks to Dr. R.N.Gupta, Principal, Hindu College, Moradabad (who nowadays is the V.C. of Poorvanchal University, Jaunpur) for providing constant help in many ways.

I am also thanks to DR. V.K.Sharma, Head, Statistics Deptt. Hindu College, Moradabad for helping me in statistical analyses. My thanks are also due to my collegues and friends who extended their help and co-operation in enriching this study. In the last the investigator also feels thankful to Mr. Sunil Mohin who typed this project.

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INTRODUCTION

"Creativity" is a problem for educators. Many who would like to nurture it in students have trouble doing so within the constraints of the system. Some are impatient with creativity because it smacks of specialness , if not elitism - currently unpopular ideas. Others just donot think there is much they can do about it, except stock it with knowledge, standout of its way, and hope for the best. A few are threatened by it. It is hard to measure. Dealing with it creatively demands more creativity than some institutions have shown.

Simply understanding the term " Creativity" is a problem. It is a characteristic we attribute to a person, group or organization who (or which) has acted or can be exected to act, in a creative manner. But what is "creative"? In its most exalted use, "creative" describes acts that are necessarily rare, and lead intentionally to new beneficial and especially appropriate, valuable, and surprising "products" which, moreoever, integrate disparate elements, transform our understanding or perception, and are rich in implications for future actions. But more to the present point, we may dispense with the obfuscating " rarity", and judge acts in terms of the relative creativity they manifest. One act is more creative than another in a given situation to the degree that it displays more of the remaining attributes in

in the list. People, groups or organizations are judged to be more or less creative according to the frequency (or relative frequency) with which they have acted (or are expected to) act)creatively, or else according to the degree of creativity, of a single act they have performed (Adelson,1976).

Some educators would record creative behaviour because they see in it a powerful motivation for learning. A number of contemporary learning theories stress the point that young children drive a powerful impetus to learning from their tendency to explore unknown situations, seek challenges which make use of freshly won skills, and deliberately find problems at the edge of their capacities. By focusing on creative acts we may therefore consider ways of increasing creativity through education, without becoming embroiled in explaining the rare specialness of exceptionally creative individuals. By xamining the attributes of such acts, and the kinds of ituations in which we wish them to occur, we may generate pproaches that aim to increase the number of people who can ct creatively in a given situation, or the range of situations n which a given person is likely to act creatively, or the degree f creativity manifested by a given person in a given situation.

How An Educator Views the Creative Process

It is generally seen that our school programmes are not ving due place to the educational experiences and proper vironment which are conducive to the development of creative tential. This may be due to inadequate understanding of the eative process on the part of teachers or difficulties in

identifying the creative children or lack of knowledge of factors which inhibit and accelerate the development of creativity. It is important to note that in our system of education alertness and questioning irritate a teacher. Clever and intelligent child is one who docile, obeys and conforms.

Most of us can recall a teacher who seemed to be full of new ideas and always ready to try them out. Most of us, sad to say, can more easily recall several whose dedication to structure drove them to emphasize rote memory and to drill us on trivia. On the other hand, many creative persons aver that detailed knowledge of a field brings a freedom from the necessity of depending upon others for information that may be critical to creative production.

From the educator's position, however, the line must be drawn clearly and firmly between the teacher taking the time to stimulate the child to develop his own associations- a very individualized form of instruction - and the teacher adopting the"efficient" strategy of providing associations for the child as the new target idea, and learning them as well only complicates the task. Concepts memorized as labels cannot be used as organizers : They become merely additional items of information. It is the process of concept forming, of simplification through classification that matters. It is clear that to form a concept, one needs a great deal of experience, specific in logical sense, from which to generalize. Creativity is not a happening in which some abstraction results.

bursts fullblown into consciousness; it is the result of intensive effert at seeking new structures of known information, of a long mixing of ideas often "felt" rather than cognized. It is only the jelling that we "know". (Merrifield, 1976).

But in the present followup study we have chosen a process definition given by Torrance (1965), Torrance describes creative thinking as the process of sensing difficulties, problems, gaps in information missing elements; making guesses or formulating hypotheses about these deficiencies; testing these guesses and possibly revising and retesting them; and finally in communicating the results. Torrance likes this process definition because strong human needs appear to be at the basis of each of its stages. If we sense any incompleteness, something missing or out of place, tension is aroused. We feel uncomfortable and want to do something to relieve the tension. As a result, we begin investigating, asking questions manipulating things, making guesses and the like. Untill the guesses or hypotheses have been tested, modified and retested, we are still uncomfortable. Then, even when this has been accomplished; the tension is usually unrelieved untill we tell somebody what we have discovered. Throughout this process there is an element of responding constructively to existing or new situations, rather than merely adapting to them.

The Back ground and Theoritical Frame Work

Popular, as well as psychological and educational thought exhibits a fascination, even an obsession with creativity. There are legitimate reasons for interest in creativity and useful

lessons to be learned from the study of creative people. Much of the current pre-occupation, however, serves to confuse our understanding of both creativity and a number of aspects of human behaviour and development.

There is general agreement that it is most clearly legitimate to talk of creativity when there is evidence of products that are both original and useful or meaningful (Jackson & Messick, 1965). So it is appropriate to call someone creative if he produces something original and valuable.

Kuhn (1963) also argues that to be an innovator in science you have to first be a traditionalist. It is obviously not sufficient to master the present state of a science to make an original contribution to it, but it is equally obvious that this mostery is necessary.

It is unfortunate that in our educational system at all levels we fail to distinguish between the convergent and divergent talent, or even worse, we try to convert our divergent students to become conformists and convergent individuals. Guilford(1957) has rightly perceived:

> " Education has emphasised abilities in the area of convergent thinking and evaluation, often at the expense of development in area of divergent thinking. We have attempted to teach students how to arrive at correct answers that our civilization has taught us are correct. This is convergent thinking....... Outside the arts, we have generally discouraged the development of divergent thinking abilities, unintentionally but effectively."

As our research evidence continued to accumulate, it

become clear that creative thinking is important in mental health, educational achievement, vocational success, career advancement and many other important areas in life. There continues to be much controversy concerning what test results or other indicators should be considered in predicting the adult creative achievement of graduate college students. Issues concerning the prediction of adult creative achievement are especially critical for graduate college students, since it is at this stage colleges, universities, IITs , medical institutions and other agencies deide who shall be admitted to higher education and what kind of scholarship and other support should be given.

The predictors usually considered in making decisions about these admissions and scholarship are grades, scholastic aptitute tests and other achievement tests. Generally, however, the determiners are measures of scholastic aptitute and achievement. As I feel there is no admitting or sholarship granting agency in India which include a measure of creative thinking ability as an item of information in making decisions. Suggestions that such an indicator be considered have been dropped rather harshly not only in India but by such authorities as Mc Nemar (1964), Martinson(1966). Newland(1963), Vernon(1964) and others. Until now, there have not been studies of predictive validity to support the reccommndation that the results of tests of creative thinking ability be considered in making decisions about admissions and other competitive entrance.

It is felt that there is an urgent need for follow up studies of those students who were found creatively talented.

Once identified as creatively talented, even though they drop, these students normally exhibit talented accomplishments whatever the area of work they have followed.

Research Questions

This study will try to provide evidence about the background factors, academic attainments, occupational status and work-values of highly creatively talented and less creatively talented. This will also indicate the quality and quantity of accomplishments, if any, of these groups. Specifically the purpose will be to determine.

1. Do young people identified as creatively talented during college years become creative and productive adults, whatever the area of work they follow ?

2. What are the occupational choices of creative students identified on the basis of creativity tests?

3. To what extent the creatively talented adults are satisfied with their jobs.

4. What is the marital status and ordinal position etc.of the creatively talented adults?

5. What are the work-values of creatively talented adults?

6. What background factors and academic attainments characterize creatively talented adults?

Many more questions will be answered including those relating to the long range predictive validity.

A Brief Overview of Work Already Done in the Area of Proposed Study

No research has been done specifically on the background and achievements factors of creative and talented adults in our country. However, a few studies have been reported on the socio-cultural backgrounds of scientists and teachers. Sinha (1970) made a study of socio-cultural and organizational context of professional environment of Indian scientists and found that Indian scientists predominantly come from middle economic class and the upper Hindu caste. Compared to the factors of caste and religious community linguistic affiliation seems to play a more significant role in the selection of personnel and in the formation of cliques in the scientific organization. A similar study by Jaysuriya (1970) on social characteristics, career values and attitudes of ceylonese research scientists, by and large, corroborate Sinha's findings. Chaudhari and Raina (1975) studied background of doctorates of Indore University and found that the subjects belonged to the average socio-economic group. The study also indicated that the engineering and science faculty doctorates were drawn from better educated homes and perhaps with longer traditions of education, than doctorates of Arts and Commerce faculties.

The major short-range and long range predictive validity studies of the Torrance Tests are summarized in Table I & II below.

TABLE I

Summary of short-range(One week to nine months) Predictive validity studies of the Torrance Tests of Creative Thinking

Investigator and date	Sample	Number	Creative behavior Predicted	Level Signif.
Weisberg & Springer, 1961	Gifted 4th Graders	32	Humor, fantasy	.01
Torrance, 1963	2nd-6th Graders	126	Creative ideas about science toys and uses	.01
Yamamoto 1963	5th & 6th Graders	40	Originality of imaginative stories	.01
Mac Donald & Raths,1964	Ages 9-12	72	Differential response to curriculum tasks	.001
Torrance & Hansen,1965	H.S.Bus. Teachers	12	Provocative classroom questions	.01
Bentley, 1966	Grad.Stud. in Ed.Psy.	76	Subject matter tests of productive thinking (r=.53);inventiv-level of creative solutions of mental health problems (r=.38)	.01
Hansen, 1967	H.S.Bus. Teachers	12	Creative classroom behavior, questions, etc.	.01
Lehman, 1969	High school students	21	Creative questions in science	.01
Strom & Larimore,1970	Elementary teachers		Teaching success in inner-city schools Verbal Fluency (r=.60) Fig.Elabor (r= .49)	.01

TABLE II

Summary of long-range predictive validity studies of the Torrance Tests of Creative Thinking

Investigator and date	Nature of Sample	Number Subjects	Length Study	Behavior Predicted	r of Val.
Torrance, Tan & Allman, 1970	Jr. Elem. Educ. Majors	114	8 yrs.	Creative teaching behavior	.62* .57*
Torrance, 1969	12th Graders	46	7 yrs.	Highest Cr. Ach.	.50*
				Quantity of Cr. Ach.	.46*
				Creativeness of Aspir.	.51*
Cropley, 1971	7th Graders	111	5 yrs.	Ach. in cr. arts and sci.	.51*
Witt, 1971	2-4th Graders Selected	16	6 yrs.	Outstanding Ach. in creat.	(87%)
Torrance, 1971	7-12th Total	236	12 yrs.	Quantity and quality of cr. achievements	.51*
	Males	117	12 yrs.		.59*
	Females	119	12 yrs.		.46*

* Significant at better than the .01 level.

There are few studies in the recent literature of creativity in adolescence and adults during the school and colleges years. Feldhusen, Treffinger and Elias (1970) found that the originality and flexibility scores predicted educational progress, but that the fluency score did not. This result suggests that the kind of creativity important to school learning in the production of alternate structures, either categorical or functional.

In an interesting study of personal influence on creativity, Chambus (1972) surveyed young psychologists, hominated for their creativity, regarding their most facilitating and most inhibiting professors. The professors identified were asked to respond to personality inventories. Chambers reports that the facilitating teachers self-reported themselves as more introverted and more aesthetically sensitive than did the inhibiting teachers, in contrast, the lather reported themselves as more perserving. The young psychologists recalled their facilitating teachers as more accessible to students, more interested in research than teaching, and more willing to discuss issues of the discipline; similarly, they also recalled their professors as being highly selective in choosing students to work with them.

Kuhn (1963) argues that to be an innovator in science you have to first be a traditionalist. It is obviously not sufficient to master the present state of a science to make an original contribution to it, but it is equally obvious that this mastery is necessary. It may seem less important to be a traditionalist if you are to be an innovator in the arts, but

Jodorowsky, creator of the Original film El Topo, suggests otherwise. As he puts it, " In art, he who is no-one's child is a son of a bitch" (Firestone,1971). By calling divergent thinking tests creativity tests, we imply that it is possible to be an innovator without being a traditionalists, and that there are sale days and short cuts with creativity.

Regardless of the reasons for calling divirgent thinking tests creativity tests, the main thing in their favour is their congruence with the popular stereotype of creativity. The evidence of their predictive validity is far from consistent (Nicholls, 1972, Kogan,1973; Koganand Pankove,1974) and their construct validity is also questionable (Feld-man, Marrinan, & Hartfeldt, 1972). As other measures, including conventional intelligence measures (Klein & Evans, 1969; Torrance,1969), also predict creative behaviour, we must again wonder why divergent thinking tests but not tests of intelligence or motivation are called creativity tests. It is perfectly reasonable to entertain that divergent thinking is important in creative production, but this is no justification for calling divergent thinking tests creativity tests. This unfortunate prectice appears to have stopped researchers from looking at other determinants of creative production and to have stopped them looking more carefully at divergent thinking. Cropley's thrust of his emperical work can be conceptualized as concerned with the validity of the creativity concept (1966, 1967, 1971). He has made efforts to demonstrate that creativity is relatively stable over time and that it predicts something about behaviour that is not already predictable from existing concepts. Cropley has also indicated that it would be wrong to argue either that convergent and

divergent thinking cannot be distinguished from each other factorially, as some authors have suggested, or that they are completely independent of each other. He does not feel that creativity is a separate intellective mode. High scores on tests of divergent thinking will tend to obtain high scores on convergent thinking and vice versa, although these two kinds of thinking are centainly not identical. Cropley believes that conventional skills may provide the basis upon which creative production rests.

Establishing a Criterion of Creativity

A major question in attempting to demonstrate the validity of tests claiming to measure creativity is that of establishing a criterion of creativity. Just what is regarded as creative varies not only from society to society, but from person to person, and even from time to time within a given society. In the face of this problem, attempts to study creativity have used such criterion as production of works generally acknowledged to be creative such as a poem or a movel(Drevdahl and Cattell, 1958), public acclaim for creative eminence (Frevd, 1910), or judgement by peers as having made a creative contribution(Barron ,1969).

However, as Barron has pointed out creativity may manifest itself in a variety of styles , including not only the capacity to produce creative work oneself, but also the capacity to energize and crystallize creative effort in others. Creativity also ranges across a vide variety of fields, so that it is necessary to take account of creativity in science, mathematics, engineering and similar fields, as well as

artistic fields.

Thus as far as the construct validity of creativity tests is concerned, it can be said that tests have now been developed that, while correlating highly among themselves, are relatively independent of conventional intelligence tests. Further more, this finding holds true across a variety of ages and educational levels. The finding is even more striking when groups of individuals pre selected for high intelligence and studied. In this case, virtually zero cross-correlations are sometimes obtained. Clearly , this finding is, to some extent at least, an artefact of restriction of range in the intelligence scores. None the less it has led to the idea that there is " threshold" IQ, beyond which creativity and intelligence become completely independent of each other (Yamamoto,1964).

In one of the major study Vaughan(1971) has shown that creativity tests are significantly related to a test criterion of musical creativity. However, to demonstrate convincingly that so called "Creativity" tests really do measure creativity, a long -term predictive study of the kind conducted by Terman (1925) in connection with intelligence tests is necessary. What is needed is to examine the real-life behaviour of groups of people previously identified as creative on the basis of high scores on creativity tests, and to show that these people are subsequently creative in their real lives. Evidence that such people subsequently followed pursuits of a creative kind or made significant creative achievement would be very compelling.

One study along these lines was that of Wallach and Wing (1969). They related scores on creativity tests administered on admission to university to what they called " non academic talented accomplishments during the high school years immediately preecding testing. The criterion data on out of school achievements were derived from such areas as art, drama literature, music , leadership, and so on. An incidental finding was that, as is consistently reported in the literature, school achievement and IQ were closely related.

They also showed that non-academic accomplishments were not significantly related to IQ. However, the major finding was that students classified as high scorers on the creativity tests obtained significantly higher scores for out of school achievements in the creative areas studied.

One another quite extensive study of a longitudinal kind has been conducted by Cropley (1967). In 1964 a battery of Torrance-Guilford creativity tests was adminstered to approximately 350 students in grade 7 in a junior high school in Edmonton. It should be mentioned at this point, however, that the creativity tests were scored only on the dimension of originality, which Torrance, Tan and Allman (1970) concluded involves the "Essence of creativity". Subsequently, two follow up studies have been carried out with this group. One after the passage of five years, the other after seven years . Some of the main findings are given below.

In April,1969, almost exactly five years after the initial test adminstration, 111 of the original 345 children

completing all tests were re-located in a high school to which they had transferred since 1964.

The sub group completed a questionaire giving information about their non-academic talented accomplishments during the year immediately preceding retesting. Non-academic talent was assessed in four of the areas discussed by Wallach and Wing-art,drama, literature and music, areas of artistic rather than scientific or technological creativity. Assessment of creativity in these four areas was carried out by asking the children to describible their degree of involvement in the areas during the previous year, and assigning scores according tox a seven point scale. The relationship between this predictor battery and the criterion battery was then tested by calculating the canouical correlations between predictors and criteria for males and females separately and for the full sample combined. In case of boys canonical correlation was marginally significant but in case of girls the correlation was not significant . For the full sample a significant correlation was found.

The question of whether the "Validity coefficients" reported are satisfactorily high or not is partly dependent on the reliability of the measures involved. For example, Guilford(1966)has predicted th that validity coefficients of creativity tests will always be low, since they will probably have low reliabilities.

However, this conclusion has been seriously questioned in seven year study conduited by Maslany(1973). A more encouraging finding in the seven year study was that creativity tests effected a significant and sizeable increase in the prediction of academic achievement in the first year of university studies among those students who reached this level.

On the basis of the above review of research and the directions in which research in creativity is proceeding, Khatena (1977) and Torrance (1980) have strongly pleaded the need for follow up and long range studies. Studies of these ypes are few and isolated. In India no attempt has been made yet to determine whether creativity tests administered to school and college students will predict adult creative achievements. This study has been attempted to explore this and many other research questions.

METHODS

Sample : Initial Data Collection

The subjects used in this study were enrolled in B.Sc. during the session 1975. Each participant had indicated on admission to the college, his intention to follow an academic programme eventually leading towards bachelor degree in science. All the students were studying in first year of the two years degree course in science at the time of administration of the Torrance Tests of Creative Thinking, Raveis Standard Progressive Matrices , Mandsley Personality Inventory, Choice Dilemma Procedure (a risk -taking measure) and Embedded Figures Test. The sample for final investigation for whom complete data were available in 1975 consisted 425 (Four hundred twenty five) subjects. Since sex, age and educational status have been recognized as important variables in researches on creativity (Stein,1953, Helson,1961, 1967 and 1968; Wallach and Kogan, 1965; Wallach and Wing, 1969) necessary steps were taken to obviate the effects of these, if any in the present study. In 1975 the sample was drawn from middle class socio-economic status, having same educational level(B.Sc. Science) and belonging to the same sex(male). The mean age of the sample was 10 years as calculated to the nearest month of the testing time. It should be mentioned at this point, however, that the creativity tests both verbal and non verbal were administered to the subjects. The scores obtained on each of the fourtasks Product Improvement, Unusual Uses, (Verbal tasks); Picture completion and Circles

(Non Verbal tasks), were scored for fluency, flexibility and originality and the total sum of verbal and non verbal constituted the composite creativity index for an individual.

On the basis of composite creativity score the subjects were classified as highly creativity talented and less creatively talented. This was done by dividing the subjects at the median point. Above the median point the subjects were classified as creatively talented and below the median point as less creatively talented. By doing so all the cases in the sample were utilized rather than just upper and lower extremes. All the overlapping cases were randomly assigned equally among the high and the low group.

Follow-up Study Participants

In the session 1985-86 a hunt was started to contact as many subjects as possible. A total of 425 subjects were contacted through mail and attempts were made through a variety of procedures to obtain current mailing addresses for them. In the first attempt the response was very poor and only 53 persons replied positively.

After getting the addresses the investigator tried to contract them through mail. Nearly 100 subjects replied positively and others were again requested to respond to the investigator's querry. Finally the investigator was able to get response from 142 subjects. Then all of them were sent the related questionnaires and other inventories with a self addressed stamped envelop. After a week they were again requested to

send the filled up questionnaires and other inventories. Then a fortnight later the investigator was able to get only 25% questionnaires back. Then the subjects were asked again and again to returned back the completed questionnaires. But it was not possible to get them back and ultimately the subjects were contacted personally either by the investigator himself or the research fellows who were working with the investigator. It is a long history and sometime painful to get filled up questionnaires from all the subjects. After a long patience and a contineous trial the investigator himself contacted as many subjects as possible. It was either in the early monning or in the evening to have a personal contact with the subject. It took a long time to get back the completed questionnaire from 126 subjects. Finally 120 subjects were included in the study because complete data was not available for all the subjects.

The main age of the subjects at the time they were contacted ranges from 30 years to 33 years with mean age 31 years and six months.

INSTRUMENTS

Torrance Tests of Creative Thinking

The tests contained in the Torrance Battery are based on the creative process defined by him as : a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies and so on, identifying the difficulty;

searching for solutions, making guesses or reformulating hypotheses about the defeciencies, testing and retesting these hypotheses and possibly modifying and retesting them, and finally communicating the results. This definition describes a natural human process. Strong human needs are involved at each stage. If we sense some incompleteness or disharmony, tension is aroused. We are uncomfortable and want to release the tension. Since learned ways of behaving are inadequate, we begin trying to avoid the commonplace and obvious (but incorrect) solutions by investigating, diagnosing, manipulating and making guesses or estimates (Torrance, 1974).

Four batteries of test activities, two verbal and two figural were created and assembled after about 10 years of research in India. These batteries are called the *Torrance Tests of Creative Thinking*. Both the figural and verbal forms can be used from Kindergarten through graduate school. The tasks or activities chosen for the tests are of those types that could be most easily and economically administered and scored. Although creative thinking may manifest itself in other than verbal and figural forms, some of the most important products resulting from the creative thinking process are found in these forms. On the basis of Torrance's analysis of the thinking manifested by scientists, writers and others in making outstanding creative achievement, he has tried to assemble batteries of figural and verbal activities that require kinds of thinking analogous to the thinking involved in recognised creative achievement. The selection of the tests in verbal and Figural Forms was guided by factor analyses of a veriety of tasks constructed by the author. To ensure the widest possible coverage, relatively uncorrelated tasks

were selected. A description of these tasks reveals their diversity. The verbal parts used in the present investigation are : Product Improvement & U nusual Uses. The figural part include the Piture Completion and Circles tasks.

Product Improvement Activity is a complex task with a ~~gh~~ high degree of face, validity. The activity is also attractive from the stand point of administration and scoring. The most subjects at all age levels, It is an interesting task. It permit them to " regress in the service of the ego" and enables them to play with ideas that they would not dare express in a more serious task. It provides an object for manipulation, making obvious certain aspects of the creative process.

U nusual activity is a fairly direct modification of Guilford's Brick Uses Test. The task is in part a test of ability to free one's mind of a well established set. This type of rigidity seems to increase with age and with mental disturbance.

Picture Completion Activity is an adaptation of the Drawing Completion Test, developed by Kate Franck and used in studies of creativity by Barron (1958) and others. The incomplete figures technique has been used in a variety of other purposes (Kinget, 1962). An incomplete figure sets up in an individual tensions to complete it in the simplest and easiest way possible. Thus, to produce an original response, the subject usually has to controll his tensions and delay gratification of this impulse to closure.

The second figural task is the circles Tests which consists of a page of 36 one inch circles. The subject is asked to

use the circles as the main part of the objects which they sketch. Fluency, flexibility and originality are encouraged by the instructions and test records are scored for each of these three qualities.

A time limit of ten minutes was imposed for each task. These activities are scored for verbal fluency, verbal flexibility, verbal originality figural fluency, figural flexibility and figural originality. The interpretation of the scores is as follows.

Verbal Fluency : This score reflects the test taker's ability to produce a large number of ideas with words. Since there are two verbal tasks and each attempts to tap a somewhat different kind of ability or mental process, further clues concerning a person's mental functioning may be obtained by looking at the subject's productions for each of the separate tasks.

Verbal Flexibility : This score represents a person's ability to produce a variety of ideas, to shift from one approach to another, or to use a variety of strategies. One would expect a person low in flexibility to have a tendency to stick to a narrow range of responses. Such a performance might to be a result of a rigid pattern or habit of thinking, a narrow range of information and/or experiences, limited intellectual energy and/or low motivation. In general, one would hypothesize an opposite interpretation of high scores. In some cases, however, extremely high flexibility scores in relation to fluency may characterize the person who jumps from one approach to another and is unable to stick

to any one line of thinking long enough to really develop it.

Verbal Originality : This score represents the subjects' ability to produce ideas that are away from the obvious, a high score on verbal originality usually has available a great deal of intellectual energy and may be perceived as rather non-conforming. He or she is able to make big mental leaps or " cut corners" in obtaining solutions, but this does not mean that the person is erratic or impulsive. In fact, the making of original responses requires the ability to delay immediate gratification or reduction of tension in order to get away from the obvious, easy, but low quality response.

Figural Flexibility : The interpretation of the figural flexibility score is basically the same as for verbal flexibility except that we are concerned with figural rather than verbal modes of thinking. A person might be quite flexibile in viewing manipulating and otherwise using figural elements and at the same ~~tim~~ time be quite restricted in shifting approaches in dealing with words. Figural flexibility is most clearly manifested in the circle activity. It is in this activity that the subject must return to the same stimulus and each time perceive it in a different way.

Figural Originality : The interpretation of the figural originality score is similar to that for verbal originality, except that the content is figural rather than verbal. Perhaps even more than in the case of verbal originality, a high score requires an ability to delay gratification or reduction of tension. Anchors to interpretation can be derived by looking at the

originality scores in relation to fluency scores. A person may produce a small number of responses none or few of which may be original. Another person may produce a large number of responses none or few of which may be original. Another person may produce a large number of responses, all of which are high in originality. A third person may produce responses of high originality but be unable to or choose not to elaborate any of them, while still another may produce no original responses but may elaborate the unoriginal responses to a high degree. These different kinds of performances represent obviously different kinds of mental functioning.

Reliability :

Although most of the customary concepts of reliability are relevant to the assessment of creativity, the very nature of this ability creates a number of problems in interpreting relaiblity data. Most of the theories of creative functioning emphasize the significance of emotional factors, bodily stages, group atmosphere and the like. There are some like Gordon(1961) who insists that " in the creative process emotional component is more important than the intellectural, the irrational more important than the rational." Another difficulty in this context is that the life experiences of an individual might help or hinder creative functioning. Emotional, physical, motivational and mental health factors also affect creative development and functioning and are likely to lower the test retest reliability . However, some of the realiability studies are reviewed below.

An experiment was conducted by Torrance to determine the extent to which unselected participating teachers and educational secretaries can reliably score responses to the verbal and figural forms, without any training. He found very high correlation : .95 to .99 for fluency, .94 to .99 for flexibility , .66 to .99 for originality and .82 to .97 for elaboration.

In a number of test- retest reliability studies, as reported by Torrance (1966) , reliability coefficients were generally found higher for fluency and flexibility than for originality. However, these results were not confirmed in an other study (Dalbex, 1966) who obtained test retest reliability coefficients of .59 for fulency, .35 for flexibility and .73 for originality over a four-year period.

Using batteries consisting of most of the tasks included in Verbal and Figural Forms A and B , Sommers (1961) and Wodtke (1963) have also reported quite significant test retest reliability coefficients. While Sommers reported reliability coefficients of .80 to .97 for his two samples, Wodtke reported the coefficients ranging from .34 to .79 for separate activities.

Mackler and Shontz (1965) obtained test-retest reliabilities of .61, .62 and .71 for fluency, flexibility and originality respectively between the first and second testing; .75, .74 and .66 respectively between the first and third testing.

Yamamoto (1962) obtained reliabilities of .75, .60 and .64 for "Unusual Uses" of tin cans activity and .86, .69 and .77 for Unusual Uses of the toy monkey. He also obtained satisfactory reliabilities using alternate forms. House (1965) using the Product Improvement Test with 31 mentally retarded youngters with an elapsed interval of about six months, obtained reliabilities of .85 and .76 and .68.

Validity :

A person can behave creatively in an almost infinite number of ways. Therefore, according to Torrance, it would be ridiculous even to try to develop a comprehensive battery of tests of creative thinking that would sample any kind of universe of creative thinking abilities. Torrance does not believe that any one can now specify the number and range of test tasks necessary to give a complete assessment of a person's potentialities for creative behaviour. He does believe that the sets of test tasks assembled in the Figural and Verbal batteries : Form A and B , sample rather a wide range of the abilities in such a universe. However, Torrance admits that these test tasks do not sample the entire universe of creative abilities.

A large number of studies employing the TTCT have been conducted to increase understanding of the qualities being measured by the tests. Some of those studies have involved the comparison of the personality characteristics of persons achieving high scores on the tests with those who have low scores, while others have involved simple correlations

between creativity test scores and other measures. Studies involving children, high school youth and adults clearly indicate high construct validity of the TTCT.

Similarly, studies using a variety of creativity criteria as indicators of concurrent validity such as, peer nominations, teacher's nominations, sales productivity educational achievement have been conducted. The results of these studies indicate that the test has concurrent validity.

Various attempts have been made to establish validity and reliability of Torrance Tests of Creative Thinking in India. Researchers like Goyal(1973), Raina(1970 ,1971) Pathak(1962) have demonstrated validity and reliability of the tests. The first and second volumes of Creativity Newsletter Published by the Department of Physics, Aligarh Muslim University record various studies on validity and reliability of the tests. Gakhar and Luthra (1974) , selected a sample of seventy two students from ninth and tenth grades for establishing the reliability coefficients of all seven activities included in verbal Form A. The correlation coefficients, with two weeks interval ranged from .66 to .92 for fluency, .67 to .73 for flexibility and .46 to .91 for originality. In another study Gakhar worked out test. retest reliability coefficients of figural Form A and the range of these coefficients was .62 to .67 for fluency, .60 to .76 for flexibility and .55 to .69 for originality.

All these studies show that TTCT is quite valid and reliable test and can be used with various groups of subjects in India. Confidence in these tests can be placed because

of the recently reported long range predictive validity study by Torrance (1971,1981) using both publicly recognized and acknowledged creative achievement and self reported peak creative achievement as criteria. Factorial validity of TTCT was also established by Basu and Jawa (1973).

THE Follow-up QUESTIONNAIRES

Two follow-up questionnaires and one work values inventory were used. The first questionnaire elicited information about age, marital status number of children, political preference, educational qualification of the father,mother and wife, birth order, educational achievements, future educational plans, academic honors, present position, career ambitions and experiences with a mentor. This questionnaire also contained questions to elicit recollections of teacher behaviours that " made a difference" in their careers.

The second questionnaire was designed primarily to obtain measures of what might be called the "Creative style of life" achievements of the subjects. It emphasized creative achievements of the kind that are not ordinarily publicly recognized and acknowledged. The questionnaire also contained questions related to their scientific achievements, no of papers published in different recognized journals, no of financial grants received, received award for scientific paper or project, designed and constructed and original piece of scientific appratus, and appointed as a teacher. The subjects were also asked that there are many ways of showing productive and outstanding achievements while you are doing your present job or jobs you have

done earlier. We are interested in knowing your accomplishments you made while on the job. Those accpmplishments which are original and can be considered as major contribution may be listed.......''

They were also asked " that after completing your education, in case you have made any significant accomplishment or received any honours or award in other areas say, leadership, music, literature, art, drama, social service and any other area of life. Please list them also."
In the last the subjects were asked that looking back upon your career now, what do you feel about your achievements? If you feel satisfied, what have been the factors responsible for your achievements ? If not, what have been the major spurs obstacles. to continued achievement.

CRITERION MEASURES

Quantity of Creative Achievements

The questionnaire used to obtain this index is similar to the one used for many years by the National Merit Scholarship programme (Holland,1961) , the studies of Wallach and Wing (1969) and others. A measure of quantity of creative achievements was obtained by adding the member of creative achievements listed by each subject. The questionnaire called for reports of such achievements as member of papers published, grants received, articles written, member of articles or poems composed; awards in arts, literature music or leadership; and instructional material produced.

Quality Creative Achievement

The measure of quality of creative achievement was based on the ratings of three judges of the descriptions of the three most creative achievements reported by each subject. The judges were instructed to rate these achievements on a five point scale in terms of the levels of creativity reflected into the three achievements described. Other creative achievements described throughout the questionnaire were used, especially when inadequate information was given to the question about highest creative achievements.

Creativeness of Future Aspirations

The measure of creative aspirations was based on similar ratings of the statements of the subjects concerning what they would like to do in future assuming the necessary talent, training and opportunity. This index consists of the ratings of three judges of the creativeness of the future career images of the subjects as revealed by responses to two questions: One about realistic career aspirations and the other a more fantasy oriented questions about future aspirations.

To explore the role of the predictors in creative careers in specific fields, each subject was given a rating in each of the creative areas. A rating of zero was given subjects reporting no creative achievements in the area in question, a rating of one was given if the subject reported one creative achievements in in an area; a rating of two was given if the subject reported

two creative achievements in an area or a larger number of moderate achievements in the area.

Work Values Inventory

An attempt to construct a work value inventory was made by the investigator himself in 1985. Inclusion of any value will have to be based on an adequate theory of vocational development and empirical research on occupational values. Super's Inventory (1962) was the only one which was based on values derived from both theory and existing researches. Since this inventory was meant for and standardized on American population. It was felt that it might not be useful to use this inventory in context of Indian culture but the inventory of super had helped the investigator in constructing the present inventory in Hindi. The following eleven values were included in the inventory.

1. Power
2. Security
3. Adventure
4. Economic Gain
5. Leisure
6. Variety
7. Job freedom
8. Creativity
9. Advancement
10. Family
11. Prestige

The subjects were asked that this in an inventory to find out what type of work appeals to you. This is not a test and there is no right or wrong answer. Only that answer is correct which appeals to you.

Scoring :

From the work-value inventory separate scores were obtained for each value area. These scores were obtained by assigning memerical values 5,4,3,2 & 1 for most important, highly important, medium important, little important and non important ratings respecitvely. Thus for the values that have been described by five statements the maximum score would be 25 and minimum 5.

Reliability :

The most obvious method for finding the reliability of test scores in by repeating the same test on a second occasion. Product moment correlations were computed for each value from the sample of 102 cases. In case of 5 work values security, adventure, economic gain, advancement and variety the correlations were .62, .64, .65, .62 and .66 respectively. There were high correlations in case of Power, Leisure and Family. These correlations were .78, .76; and .80.Job freedom creativity and prestige showed slightly low correlations and these were .56, .54, and .50 respectively.

Validity :

The inventory was validated against the existing inventory in English developed by Vasantha (1972).

Statistical Analyses :

For the purpose of analysing the data two types of analyses have been made. First, using creativity index as the predictor, product moment coefficients of correlation have been

obtained. Second, a comparison of the highly creatively talented and less creatively talented has been made on quantity of creative achievement, quality of most creative achievement and creativeness of aspirations and other variables. For this purpose 't' ratios were computed for each of the mean test scores of the highly creatively talented and less creatively talented groups.

RESULTS AND DISCUSSION

The subjects of this study, it will be recalled, were enrolled in B.Sc. during the session 1975. Out of the total 425 subjects who were tested for different measures of Torrance Tests of Creative Thinking, Raven's Standard Progressive Matrices, Maudsley Personality Inventory, Choice Dilemma Procedure (a risk taking measure) and Embedded Figures Test; 120 were identified in 1996. On the basis of composite creativity score the subjects were classified as creatively talented and less creatively talented. In the present investigation the creatively talented group had 50 subjects and less creatively talented, 70. This study will answer many questions relating to process, development and other factors which effect creative behaviour. It will also be of great interest to findout if creatively talented subjects who were identified in 1975 have shown exceptional achievements. This study will also be helpful in providing some data relating to predictive validity of Torrance Tests of Creative Thinking.

Findings :

As described earlier two follow-up questionnaires were used to elicite the maximum information. The first questionnaire elicited information about age, marital status, mumber of children educational achievements, academic honours attained, experiences with a mentor and dreams of the future. The major findings of the questionnaire are given below :

The educational background of the fathers of both creatively talented and less creatively talented are as under :

TABLE 1

Educational Background of the Fathers of Creatively Talented and less Creatively Talented

Creatively Talented			Less Creatively Talented	
Category	N	%	N	%
Illiterate	01	2	03	4.3
Non Matriculate	02	4	04	5.7
Matriculates	07	14	12	17.1
Intermediate	10	20	20	28.6
Graduate	17	34	19	27.1
Post Graduate	08	16	10	14.3
Higher (Ph.D. M.D. M.Tech. etc.)	05	10	02	2.8

The mother's educational qualifications of both the groups are as given below :

TABLE 2

Educational Background of the Mothers of Creatively Talented & Less Creatively Talented

Creatively Talented			Less Creatively Talented	
Category	N	%	N	%
Illiterate	03	6	04	5.7
Non Matriculate	11	22	24	34.3
Matriculate	13	26	23	32.8
Intermediate	12	24	14	20.0
Graduate	07	14	03	4.3
Post Graduate	03	6	01	1.4
Higher	01	2	01	1.4

The wife's educational qualifications of both the groups are also given below :

TABLE 3

Educational Background of the Wives of Creatively Talented a less Creatively Talented

Creatively Talented (N=50) Category	N	%	Less Creatively Talented (N=70) N	%
Illiterate	01	2	03	4.23
Non Matriculate	03	6	09	12.86
Matriculate	14	28	17	24.28
Intermediate	06	12	13	18.57
Graduate	11	22	12	17.14
Post Graduate	03	06	05	7.14

12 did not answer this question

11 did not answer this question

Occupational Choices of the Parents

Most of the subjects have mentioned that their fathers had retired from different services. 70% subjects have mentioned that their mothers are /were not working outside home. Either they stayed at home or worked for the family in the surroundings of the house. The occupational choices of the fathers of both the groups are given in Table 4.

TABLE 4

Occupational Choices of the Fathers of Both the Groups According to NCO(1968)

Category	Creatively Talented	Less Creatively Talented.
i) Professional	10	08
ii) Technical	04	03
iii) Administrative	-	-
iv) Clerical	07	12
v) Sales Workers	12	16
vi) Service Workers	02	03
vii) Farmers, Fisherman Hunters etc.	06	13
viii) Production Related Worker	06	10

ix) Non Classified Job Seekers	-	-
	47 (Three subjects did not answer)	66 (five subjects did not answer)

The economic status was determined by asking the subjects to rate their parents income in 1975-76 on a four point scale. The ratings obtained are presented below :

TABLE 5

Total Income	Talented	Less Talented
Rs. 20,001 and above	03	02
Rs. 15,001 to 20,000	08	06
Rs. 10,001 to 15,000	07	16
Rs. 1,000 and less	19	31

Rest of the subjects did not answer this question

General Characteristics of the Subjects

(i) As far as age is concerned both the groups range from 30 years to 33 years with mean ago 31 years and six months.

(ii) All the subjects were married at the time of these testings.

(iii) Out of the total sample of 120 subjects only 2 (two) in creatively talented and one in less creatively talented category have mentioned that they belong to SC category.

iv) Number of Children : 11(Eleven) subjects in creatively talented and 23 in less creatively talented category did not mention the number of children they had. On an average the no. of children range from two to four in both the categories. One thing is important to note that only those subjects had four children who had consequently two or three female children.

(v) In both the groups the height of the subjects ranges from 5 feet to 6 feet 11 inches with no mean height 5 feet 5 inches.

(vi) In creatively talented category out of the total sample 44 subjects were right handed; 03 left handed and 03 did not answer this question.

(vii) In creatively less talented category out of the total sample 62 were right handed, 02 left handed and six subjects did not answer this question.

(viii) In both the categories most of the subjects did not mention their blood group. Only nine subjects from both the categories had mentioned that their blood group were (six) 'A' and 'B' (Three).

(ix) Birth Order : The birth order of both the groups have been given in TABLE 6.

TABLE 6

Birth Order of Creatively Talented and Less Creatively Talented

Birth Order	Creatively Talented		Less Creatively Talented	
	N	%	N	%
First Born	05	10	08	11.4
Second Born	23	46	23	32.8
Third Born	17	34	27	38.6
Fourth Born	03	06	09	12.8
Fifth Born	01	2	02	2.8
Sixth Born	01	2	01	1.4

One thing is quite significant from the TABLE 6 that 56 (Fifty six) percent of the subjects in creatively talented category have been either first born or second born.

Occupational Choices of Creatively Talented Subjects

To determine whether or not highly creatively talented college students actually find fulfillment in their occupations, the responses of this study were analysed according to NCO (1968) classification. According to Getzels and Jackson(1962) the following occupations were classified as conventional : lawyer, doctor, teacher, professor, engineer, housewife, psychologist, carpenter, salesman, draftsman, nurse, farmer and the like. The following occupations were classified as unconventional:adventurer, inventor, writer, entertainer, artist, dancer, film maker, product designer, potmaker, plastic surgeon, dog trainer, Justice of the Court and the like.

The present occupations of both the groups were classified according to this criteria. It was found that most of the creatively talented and less creatively talented are working in conventional occupations. Only three subjects of the creatively talented group & one of the less creatively talented group were working in unconventional occupations. All the four subjects were working in the brassware industry either as a product designer or decorative pot-maker. One of them was an engraver. Most of the subjects have reported that they were not happy with their present job. They have opted this particular occupation because no other choice was left. They have also mentioned that choices in Indian conditions are few and one has to be satisfied with the job or occupation once achieved. The occupational choices of both the groups are given in the

following.

TABLE 7

Occupational Choices of Both the Groups

Category	Creatively Talented (N= 50)	Less Creatively Talente (N= 70)
Professional	14	17
Technical	05	03
Administrative	01	-
Clerical	11	27
Sale Worker	07	06
Service Worker	-	01
Farmer, Fisherman	02	07
Production & Related worker	06	03
Non classified		
	46 Four didnot answer.	64 Six did not answer.

The Person who Influenced Most

The subjects were asked to name the person who had changed their lives or who had influenced them most. They were also asked to remember or try to think of some incident in which one of their teachers had encouraged their behaviour and how this had made a difference in their careers and life.

Many of the subjects had great difficulty in recalling any single incident of this type. They also had great difficulty in singling out any one teacher who had encouraged their creative

behaviour or had changed the careers or life. Most of the subjects had reported that either their teacher or parents had influenced them most. The following were the characteristics of the teachers who influenced them most

(i) Friendly
ii) Motivated to think
(iii) Broad Minded
iv) Intelligent
(v) Gave importance to students ideas
vi) Ready to help at all time
vii) Visionary
viii) Helping attitude
ix) Intutive
x) Sincere

Eleven Year Follow up

People still believe it unnecessary to reward creative talent, most reasonable people recognize at least at a superficial level, the need for rewarding creative thinking. It is true that there are some children with vigorous creative imaginations who maintain their creativity inspite of rejection, ridicule and coercion. But we saw many children who had given numerous evidences of a powerful creative talent one year, deliberately and obviously sacrificing and suppressing this talent the next year. As the endence from longitudiual and follow up studies of the creative thinking abilities began to accumulate, it become clearer and clearer that creativity needs to be evergized and guided almost from birth.

The present study is also related to many other investigations of similar problems. Among these problems are the development of criteria of creative performance, and prediction of adult accomplishment. A comparison of the highly creatively talented and less creatively talented will be made on quantity of creative

achievement, quality of creative achievement and creativeness of aspirations. A comparison of highly creatively talented and less creatively talented will be made on different work-values. Researchers who have worked on such problems include Astin(1962); Barron(1963); Chambers(1964); Getzels and Jackson (1962); Guilford (1964); Torrance(1963, 1980); and Wallach and Kogan (1965).

The eleven year follow-up of the 1975 college population was conducted in 1986. Completed questionnaires were collected personally from 120 subjects of the original 425 subjects, providing data converning the creative behaviour of young people between 30 and 33 years. The product moment coefficients of correlation between the predictors established in 1975 and the criterion variables established in 1986 for the 120 subjects (who supplied criterion data) are given in TABLE 8. Information was obtained or collected personally by means of questionnaire concerning the subject's quantity of creative achievements, quality of creative achievements and creativeness of future aspiration.

A measure of quantity of creative achievements was obtained by adding the member of creative achievements listed by each subject. The measure of quality of highest creative achievement was based on the ratings of three judges of the descriptions of the three most creative achievements reported by each subject. The level of creativeness of aspiration was based on similar ratings of the statements of the subjects concerning what they would like to do in future assuming the necessary talent, training and opportunity.

TABLE 8 presents the results of the total sample of 120 subjects supplying complete information. Out of the twenty one (21) correlation coefficients all are significant except that of verbal originality. Though the correlation coefficient .173 for verbal originality is very near to the significance value. Out of twenty one correlation coefficients sixteen are significant at .01 level and the rest at .05 level.

TABLE 8

Product Moment Coefficients of Correlations Between Predictors Established in 1975 and Criterion Variables Established in 1986

Predictors	Criterion Variables		
	Quantity	Quality	Aspirations
Verbal Fluency	.62367	.46038	.47358
Verbal Flexibility	.39648	.27139	.36524
Verbal Originality	.17334	.19965	.18035
Non Varbal Fluency	.46038	.40051	.37654
Non Verbal Flexibility	.24503	.27478	.29160
Non verbal Originality	.23425	.25912	.18752
Composite Creativity	.32756	.23752	.21860

Coefficient of Correlation significant at .01 level .230
Coefficient of Correlation significant at .05 level .176.

The result of the present study shows that fluency flexibility and originality in case of Verbal as well as non-verbal and the composite are the predictors. The poorest of the creativity predictors are verbal and non verbal originality and the best fluency and flexibility. In ~~fact these two measures are better flexibility.~~ In fact these two measures are better

predictors than the originality and composite measure of creativity. All except one of the 21 predictive validity coefficients are significant at better than either .01 or .05 level, indicating that creativity scores obtained during the college years do, in fact, predict creative achievements reasonably well.

Creativity (Verbal & Non Verbal) and Intelligence in the Creatively Talented and less Creatively Talented : A Comparative Study

In this study creativity refers to those operationally defined abilities measured on Torrance Tests of Creative Thinking and expressed accordingly by the subject's scores on different tasks of verbal and non verbal creativity. It is based on the process definition of Torrance which is " a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses or formulating hypotheses about the deficiencies; testing and retesting these hypotheses and possibly modifying and retesting them and finally communicating the results (Torrance, 1965).

The means and the standard deviations and the 't' tests for the creatively talented and less creatively talented are ~~pad~~ presented in the following TABLE 9

TABLE 9

Means and Standard Deviations of Creativity and Intelligence of Creatively Talented and less Talented Subjects as Assessed in 1975

Creatively Measures	Creatively Talented (N= 50)		Less Creatively Talented (N= 70)		S.E.	't'
	Mean	SD	Means	SD		
Verbal Fluency	18.280	3.69	10.736	2.258	.544	13.737
Verbal Flexibility	12.560	3.045	7.314	2.157	.474	11.067
Verbal Originality	6.480	2.063	3.100	1.964	.371	9.110
Non Verbal Fluency	14.860	2.603	10.228	2.503	.471	9.834
Non Verbal Flexibility	10.780	2.452	6.686	1.715	.380	10.789
Non Verbal Originality	16.730	5.719	9.414	3.625	.354	8.625
Intelligence	29.980	10.185	28.014	8.176	1.678	1.172

Significance Values at .01 level 2.575
Significance Value at .05 level 1.96

The comparisons indicate that on Verbal creativity ~~indicate~~ creatively talented subjects score significantly higher mean values in all the cases for fluency, flexibility and originality than their counterpart.

In case of non-verbal creativity creatively talented subjects again score significantly higher mean valuesin case of non verbal fluency, flexibility and originality.

In case of intelligence the mean value of creatively talented subjects is 29.980 (10.185) in comparison to less creatively talented 28.014(8.176) but 't' value 1.172 is not significant. The

result clearly suggest that the mean of those who are talented were appreciably higher in comparison to the less talented. It is true and in line to the saying that creative people must be moderately high, though not necessarily outstandingly, intelligent. In this context, intelligent is best taken to mean competent in the skills and knowledge relevent to the area of work, a view implicit in Kuhn's (1963) suggestion that you have to be a traditionalist before you can be an innovator. For many categories of achievement, a moderately high level of intelligence, according to conventional intelligence measures, is probably necessary. Barron (1958) argues that creative people seek complexity and disorder rather than simplicity and order ; and complex , disordered situations allow the possibility of new orderings and creative products more than do ordered situations.

Criterion Achievement

Questions have arisen concerning the way in which predictor variables should be used in making decisions. Anderson (1960) and others have called attention to the operation of an ability gradient. Anderson pointed out that it is natural to assume that the relationship between two variables is one of correspondence throughout the whole range of the two variables and that whatever we measure in terms of a predictor variable bears a consistent relationship to the criterion variables. We can think instead of ability level in terms of thresholds and ask questions about the level of ability necessary for a certain kind of sucess and then consider the factors that determine function beyond this threshold. These considerations suggest that it might be

illuminating to look at the criterion data in terms of highly creatively talented and less creatively talented groups on the various predictor variables. The subjects were divided at the median on composite creativity and those falling in the upper half (Highly failing in the lower half (less creatively talented).

The data presented in table 10 permit a comparison of the two groups on quantity of creative achievements, quality of most creative achievement and creativeness of aspirations.

TABLE 10

Means and Standard Deviations of Quantity of Creative Achievement Quality of Creative Achievements and Creativeness of Aspirations of Creatively Talented and Less Creatively Talented

Criteria of Creativity	Creatively Talented (N=50)		Less Creatively Talented (N=70)		S.E.	't'
	Mean	SD	Mean	SD		
Quantity of Creative Achievement	6.160	2.064	4.757	1.715	.346	4.055
Quality of Highest Creative Achievement	5.700	2.517	4.057	1.913	.406	4.047
Creativeness of Aspirations	5.00	2.347	4.086	2.436	.444	2.068

Sig at .05 Level 1 96, Sig at .01 Level 2 58

The means and standard deviations in Table 10 clearly show that all three of the differentes in means are statistically significant at better than the .01 level in case of quantity and quality of creative achievement and at .05 level in case of aspirations. One thing is clear from this study that some of the subjects who attained the greatest quantity of

creative achievements and whose highest creative achievement received high ratings were not the most original.

At the time of follow-up many subjects among the creatively talented were well placed. Out of the fifty subjects two were doctors, three engineers, two Ph.Ds., three advocates, teachers and in many other fields. In comparison to the creatively talented, less talented have mentioned that out of the total subjects one was doctor, non of them was neither engineer nor Ph.D. Many subjects were teaching either at junior or high school level. Many subjects have reported that they were running their own shops or were engaged in other type of business. Here I would like to mention that Moradabad city is well known for its brassware and other decorative & engraved items and most of the local people are engaged in their own business.

Many subjects who were interviewed by the investigatior himself had mentioned that they were doing different type of work in brassware industry. One of them who did not complete his B.Sc. but was in the highly creatively talented category told this investigator that from the begining of his career he was more interested in engraving and designing of different decorative pieces of brassware. His father also worked for this industry and he too wanted to continue that profession. His previous profile on different measures also indicated that he was an introvert and independent on embedded figures test. This is because this type of cognitive mode helps him effectively to organize and to adopt a relatively intellectual or impersonal approach to such problems.

Work-Values of Creatively Talented and Less Talented Subjects

Comparison data for the creatively talented and less creatively talented are shown in Table 11. It will be noted that out of the eleven work-values four mean differences are significant. Out of the four significant 't' ratios two are positive & two negative. The mean difference for 'power' and 'leisure' work-values are in favour of less creatively talented subjects. In both the cases the means for power and leisure are 18.286 (3.560) and 16.743 (3.309) respectively in comparison to the mean values of creatively talented which are 15.420 (2.619) and 14.680 (4.373) respectively. The 't' ratios 4.833 and 2.943 are significant at .01 level in both the cases (Table 11).

TABLE 11

Means, Standard Deviations and 't' ratios of Creatively Talented and less Creatively Talented subjects on different Work-Values

Work-Values	Creatively Talented (N=50)		Less Creatively Talented (N=70)		S.E	't'
	Mean	S.D.	Mean	SD		
Power	15.420	2.619	18.286	3.560	.593	-4.833
Variety	16.680	3.722	15.471	4.265	.749	1.614
Adventure	19.820	3.480	18.828	4.334	.741	1.339
Economic Gain	17.740	3.533	18.671	3.404	.640	-1.455
Leisure	14.680	4.373	16.743	3.309	.701	-2.943
Security	13.600	3.010	13.696	2.977	.544	-0.173
Freedom	15.280	3.091	13.843	3.082	.571	2.517
Creativity	19.680	3.126	17.257	3.790	.653	3.711
Advancement	17.220	3.916	16.886	3.709	.703	.475
Family	17.760	4.433	18.087	3.713	.746	-.438
Prestige	17.980	4.876	18.857	3.823	.795	-1.103

Sig at .05 Level 1.96
Sig at .01 Level 2.58

The other two work-values where 't' ratios are significant, are'freedom' and 'creatively'. The mean values in both the cases are higher in favour of creatively talented subjects. An examination of the mean values indicates that in case of variety & adventure the means are in favour of creatively talented but non of the mean differences are significant. In case of 'economic gain' and 'prestige' the mean values are in favour of less creatively talented.The results clearly show'freedom' in their work and are characterized by new inventions, new discovery and make a more notable contribution in their respecitve work. The differences between creative individuals may reflect, to some degree, the area of their work. Roe (1952) has also shown that workers in different disciplines differ in characteristic ways. The evidence suggests there are different requirements for success in different disciplines. The picture is further complicated by the fact that, within a discipline, different qualities may facilitate outstanding achievement mf at different stages of the discipline's development.

On the other hand less creatively talented individuals are more power hungry and leisure loing. They always think in terms of economic gain. On'family; xxkx'advancement'and'security' both the groups are almost identical. All the subjects thinks about their families future advancement and always prefer security as their work-values.

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Educational Implications of the Study

The implications of this study, however, extend beyond a need for a more systematic and comprehensive assessment of student accomplishment outside the classroom for purposes of

selection. At the very least, the findings imply a need to examine college grading practices, since college education should be largely a preparation for participation in important areas of human endeavour.

Further, the results imply a need for a broader, or different, definition of both the nature of human talent and the nature of higher education. There are many kinds of human accomplishments, and each kind is likely to benefit from some type of higher education, although hot necessarily a highly academic type. In other words, our results imply a need for a wide variety of colleges, many, if not most of them, relatively unselective except on dimensions clearly relevant to their particular emphasis. Measures of non academic accomplishment would then be used in helping students find an appropriate college, rather than being used in selecting students for a single college.

Education should concern move with fashioning of creative genius that with what Murray calls " paralysis of imagination". This can happen only when in our teaching learning process, we keep in mind the multidimensional view of intellectual functioning. But unfortunately, all too often teaching of science in the colleges is charactized by an over emphases on content, while the use of information for adaptive purposes to create new ideas or cope with strange or novel setting recieves far too little attention .

Thus, far, the evidence of this study indicates that the creative thinking abilities are important in healthy

personality development and mental hygiene, the acquisition and application of knowledge and basic intellectual skills, vocational success, invention and scientific discovery and in coping with all of life's demands. It is clear that many of these thinking abilities can be measured and studied. The findingx of the study have shown that all individuals possess, to some degree , the abilities involved in doing creative thinking , that these abilities can be increased or decreased by education , and that it is a legitimate role of education to provide experiences which will develop siad abilities.

Some of the practical applications of the findings seem clear, Measures of academic potential are the Chief methods used to determine admission to college. So long as one is interested only in finding students who will do well in colleges and universities on academic potential, because it concentrates on only one of several independent dimensions of talent, has had to neglect of other equally important talents. Certainly. in the interest of social and human values, one should also be interested in finding students who will do outstanding things outside the classroom and later in life.

Long range follow up studies such as this one are always limited by the difficulties and obstacles involved in Indian situations. Location of the subjects, deaths of some of the subjects, the peculiar nature of the subject population and the lack of a single criteria that will satisfy everyone are some of the major problems which have delayed the completion of this study. Obtaining follow up data over eleven years later from 120 subjects seems like a reasonable return in these conditions. One thing which the investigator has expecially

noticed is the temprament of rural India subjects. They are not habitual of such type of follow up or testing hence they always avoid such situations. A variety of Criterion variables was used and an attempt was made to develop quantity of creative achievements, quality of creative achievements and the level of creativeness of aspirations. These can of course be refined for use in later follow up studies of these and other subjects. It is believed, however, that the achievements considered in developing these criterion measures are anchored in real life. and are meaningful. It will be better to execute another follow-up studies of those who were college graduate at the same time.

CONCLUSIONS

From the results that I have cited above, it can be concluded that :

1. Young people identified as highly creatively talented during the begining of college years do tend to become productive, creative adults.

2. Highly creative college students tend to develop careers which involve detours for relevant but unusual combinations of training and / or experience.

3. Most of the highly creatively talented adults have reported that they are not happy with their present job. They have also mentioned that choices are too limited in Indian condition and they have to be satisfied with the job or opporturnity they have achieved after many obstacles.

4. Creatively talented college students tend to differ than less creatively talented on different work - values. Both the groups were statistically significant in their mean difference on 'creativity' and 'freedom' work values and the means were in favour of creatively talented. Less creatively talented scored significantly higher on 'power' and 'leisure' work values.

5. Most of the creatively talented subjects were married at the time of this follow-up study. Fifty six percent of the creatively talented were either first or second born.

6. Long range predictive validity coefficients of Torrance Tests of Creative Thinking have also been established.

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